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Staying Vertical: Effectiveness and Implementation of Multi factorial Fall Prevention Programs for Community Dwelling Older Adults

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by

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This independent study, submitted by Rebecca Lucking in partial fulfillment of the requirements for the Degree of Master of Science from the University of North Dakota, has been read by the faculty advisor under whom the work has been done and is hereby approved.

Karen Semmens

Faculty Advisor

PERMISSION

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Abstract

Falls are costly and decrease quality of life for the growing older adult population. Prevention of falls in this population is necessary to control health care cost and to decrease morbidity and mortality in older adults. Health care providers and the health care system need to implement evidence based methods to prevent falls in older adults. This paper involves evidence-based literature reviews on the effectiveness of multifactorial fall prevention programs and methods for implementation of these programs for community dwelling adults over the age of 65. Results indicate overwhelming evidence in support of multifactorial fall prevention intervention as the most effective method in reducing falls and fall risk factors in the older adult population. Evidence based strategies from literature review for implementation of multifactorial fall prevention programs is discussed. Implication for the review of literature is that it can serve as a guide for healthcare professionals in establishing evidence-based fall prevention programs.

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Introduction

The older adult is at increased risk of falling and getting injured. There is a growing older adult population and falls create great loss for the individual and society. Currently, around 15% of the population is 65 years or older. In this population falls are the number one cause of deaths and nonfatal injuries (Mulhausen, 2009). Studies indicate of the 30% of the community dwelling older adults 65 years of age falling annually, 15% of these falls result in serious injury (Wakefield District Falls & Bone Health Task Group, 2009). Common fall related injuries include hip fractures, other bone fractures, head injuries and lacerations. These injuries can impair independent daily activities and mobility (McClure & et al., 2008). Those 75 years of age or older are around five times more likely to be admitted to a long-term care (LTC) facility as a result of a fall (Mulhausen, 2009). The cost in the United States for falls in the population of older adults over the age of 65 is around 20 billion dollars a year and this cost is expected to more than double by 2020. Further, falls can result in loss of dependence, create emotional stress and have negative social consequences (National Institute of Clinical Excellence, (NICE) 2004 & Beling & Roller, 2009). Falls in the older adult population are costly and decrease quality life indicating the importance of health promotion programs to prevent falls.

The older adult is at increased risk of falling and getting injured from falls as a result of age related factors and disease conditions. Physiological changes with age include slower reflexes, stiffness, less muscle strength, decrease balance, poor posture control, and weak abnormal and less coordinated gait with decrease height of stepping. Hearing, vision, and cognitive impairments related to age contribute to risk for falls. In addition, the older adult has a

delayed recovery from falls and possible anxiety from fear of falls that lead to increased risk of deconditioning and further falls. Lastly, the older adult population has a higher rate of clinical disease like osteoporosis that increase rate of falls and injuries related to falls in older adults (Rubenstein, 2006). Falls can be anticipated, (unsteady gait, neurological conditions), and unanticipated (vertigo, medication side effects, sudden loss of consciousness and muscle tone) (Lyons & Titler, 2004). A fall can be a sign of an underlying medical condition that needs to be addressed (Swift, 2006). History of fall(s) is the strongest indicator of falling in the future and collecting fall history is essential in fall assessment (Lyons & Titler, 2004). Health care providers need to take into consideration fall risk factors in the aging adult when providing fall prevention management.

Fall prevention measures are needed to decrease the rate of falls in older adults. According to the United States Public Health Services two-thirds of fall related deaths can be prevented (Rubenstein, 2006). Sixty percent of falls are the result of multiple fall factors and the additive and synergy effect of these factors. The risk of falls increases with the increase in risk factors (American Geriatric Society, 2010). Fifty percent of recent fallers will fall again (Wu, Keeler, Rubenstein, Maglione, & Shekelle, 2010). To decrease falls these fall factors need to be identified and interventions taken to limit fall risks. Both intrinsic and extrinsic factors can lead to falls (Letvak, 2000). Intrinsic risk factors include muscle weakness, unsteady gait and balance, history of falls, neurological conditions, cognitive decline, depression, sensory disorders (visual impairment common), vertigo, gender (females higher risk), older than 80 years of age, decrease functional ability and medical conditions (arthritis for example). Extrinsic fall risks include medications, environment factors and mobility aides. Does multifactorial fall assessment and intervention in community dwelling older adults over the age of 65 decrease the incidence of

falls and fall risk factors and what are the implementation strategies is the clinical question addressed in this paper.

Purpose

The geriatric population has an increased risk of falling and getting injured due to age and disease related factors. Injuries related to falls can decrease quality of life for the individual and caregivers and cause financial burden for the individual and society. Fall prevention is important in preventing the majority of accidental deaths and hospitalizations in individuals over the age of 65. Further, decreasing falls can help eliminate disabilities obtained from fall injuries. Falls can result from multiple reasons such as: physical conditioning, problems with balance, medication, mental status, altered elimination, medical diagnosis and environmental conditions. Addressing fall risk factors is the objective in fall prevention management.

With proper multifactorial assessment there can be appropriate interventions utilized to address fall risks. This builds on the nursing theory of Sister Callista Roy and the Roy Adaption Model (RAM) that adaptive behavior (not falling) can be developed by modifying individual responses or the environment (Thornbury, 1992). Fall interventions may involve physical therapy, education, reducing home hazards, and pharmacological intervention (Salminen, Vahlberg, Salonoja, Aarnio & Kivel, 2009). Geriatric nurse practitioners and skilled nurses in the community and health care organizations in collaboration with other members of the healthcare team can be influential in implementing multifactorial fall assessments and interventions (Diener & Mitchell, 2005).

Significance

Falls in older adults increase morbidity, mortality, decrease quality of life and are a financial strain on our healthcare system. Older adults are at high risk for falls and falls resulting

from multiple factors. There are single and multifactorial fall risk factor interventions for addressing falls. There have been many studies on the effectiveness of single and multifactorial fall prevention with some conflicting data. Finding effective evidence based fall prevention interventions is the focus of this paper.

There is strong support for fall prevention interventions, however, there is limited understanding on effective fall prevention program implementation. Studious inquiry is needed on a system and method for delivery of programs for fall prevention. Additional information needed on fall prevention programs include: cost-effectiveness, resources needed, the time line and potential for change in the older adult population (Campbell & Robertson, 2006). Research on effective fall prevention program dissemination strategies is discussed in this paper.

This paper researches evidence based studies on the effectiveness of multifactorial fall assessments and interventions and methods for implementing fall prevention programs. Summary of the literature review analysis of multifactorial fall prevention and program implementation strategies will serve as evidence based guidelines for healthcare providers and members of the community in providing cost-effective fall prevention interventions for community dwelling older adults.

Theoretical Framework

The Roy Adaptation Model (RAM) has been used as a guide for healthy aging and has a holistic perspective. The Roy Adaptation Model was developed in the 1970s and has had continuous updates (McEwen & Wills, 2011). Multifactorial fall prevention intervention builds on the nursing theory of Sister Callista Roy and the Roy Adaption Model (RAM) following the concept that adaptive behavior (not falling) can be developed by modifying individual responses or the environment (Thornbury, 1992). The basic concept of the RAM model is that individuals

are biopsychosocial human beings that strive to adapt to the changing stimuli from their environment (Masters, 2011). The RAM focuses on behavior response from stimuli based on the interrelatedness of four human adaptive systems, (physiological-physical, self-concept-group identity, interdependence, and role function). Five common elements of the RAM model are human being, input stimuli, coping process, output response, and adaptation (Flood, 2005). Sister Callista Roy developed the RAM model and she is a well-known scholarly professional. She has received honors for her research, nursing theories, practice and education (Masters, 2011).

The metaparadigm concepts (person, health, environment and nursing) of nursing are incorporated in the RAM theory. Person is defined as "an adaptive system with congnator and regulator subsystems acting to maintain adaptation in the four adaptive modes" (Masters, 2011, p.132). Environment is defined as "all conditions, circumstances, and influences surrounding and affecting the development and behavior of persons and groups, with particular consideration of mutuality of person and earth resources" (Masters, 2011, p.132). Health is defined as a "state and process of being and becoming an integrated and whole that reflect person and environment mutually" (Masters, 2011, p.132). Nursing is defined as "promoting adaptation for individuals and groups in the four adaptive modes, thus contributing to health, quality of life, and dying with dignity by assessing behavior and factors that influence adaptive abilities and to enhance environmental factors" (Masters, p.132, 2011). These definitions are important to keep in mind when utilizing the RAM model.

There are four interrelated modes to adaptation. There is the physical concept called physiological/physical mode that takes into consideration individual's physical health status and functional ability. There are three psychosocial modes that include interdependence, self-

concept, and role function that take into consideration feelings about oneself, the individual's functional role within society, and individual's dependence and relationships with others. The model states individuals have two subsystem processes to the human adaptive system and they are the cognator and regulator subsystems (Rogers & Keller, 2009). RAM assesses physiologic and psychosocial adaptation within the patient's environment (McEwen & Wills, 2011). The regulator, (physiologic coping response), and cognator, (cognitive-emotive coping response), are the subsystems that react to the input, (stressors or stimuli) in the environment (McEwen & Wills, 2011). The output response of the individual can be adaptive or maladaptive. Coping mechanisms can be inherited or genetic, (immune system integrity), or learned, (for example physical exercise as a health promoting activity). When stimuli are within the individual's adaptive zone output responses are positive and adaptive (Thornbury, 1992). Stimuli serve as input in the human adaptive system and can be the form of external environmental or internal stimuli. Stimuli can be physical, physiological, social or psychological factors (Masters, 2011). Stimuli can be classified as residual, contextual or focal (Rogers & Keller, 2009). Focal stimuli are the direct cause of the situation. Contextual stimuli are extra internal or external environmental stimuli. Residual stimuli are all other unknown stimuli. Behavior or action is the output of the human systems. Individual coping ability to external stimuli depends on their biopsychosocial adaptability (McEwen & Wills, 2011). Nursing assessment using the RAM model involves evaluation of stimuli and the coping subsystems with the four adaptive modes.

The Roy Adaptation model uses the six step nursing process. This includes assessing behaviors and adaptive modes, identify stimuli influencing behaviors, making nursing diagnosis, setting goals, implementing interventions to promote adaption or adjust stimuli, and evaluating outcomes (Masters, 2011). The fall prevention program utilizes these steps with fall screening,

comprehensive assessment, and identification of risk factors, fall prevention intervention and follow up management of fall prevention. Nursing health promotion interventions objectives are to alter maladaptive response and improve or maintain adaptive response by enhancing coping ability within the human adaptive systems and altering interaction with environmental stimuli (Masters, 2011). The diagram of the RAM model is helpful to visualize and simplify the multicomponent RAM model (Appendix A).

How is RAM model used in fall prevention exactly? Multifunctional fall assessment and interventions to prevent falls in older community dwelling adults focuses on the self-concept and physiologic-physical modes and improving the cognator subsystem (physical response to stimuli) and the regulator subsystems (psychological response to stimuli). Individual coping ability to external stimuli depends on their biopsychosocial adaptability. Older adults can age in healthy or maladaptive way depending on environmental stimuli and coping abilities. A maladaptive response using RAM theory in fall prevention management would be a fall. Coping mechanisms aide older adults in adaptation to the conditions associated with aging and to prevent falls (McCarthy, 2011). Altering intrinsic and extrinsic risk factors/stimuli and promoting adaptive ability for older adults can prevent falls through home hazard reduction, improved physical function, and improved self-concept on ability to prevent falls to decrease fear of falling.

Definitions

***Fall*:** A fall is defined as "an event whereby an individual unexpectedly comes to rest on the ground or another lower level without known loss of consciousness" (American Geriatric Society, 2010, p.1)

Multifactorial fall risk assessment: Assessment of known predisposing factors within the person and in the environment that increase the risk of falling (American Geriatric Society, 2010, p.1).

Single intervention: An intervention in one of the preceding categories, such as a balance and strength exercise program, medication adjustment, vision improvement, home/environmental modification, footwear adjustment, educational programs (American Geriatric Society, 2010, p.1).

Multicomponent intervention: A set of interventions addressing more than one intervention domain or category offered to all participants in a program (American Geriatric Society, 2010, p.1).

Review of Literature: Process

The literature review for effectiveness of multifactorial interventions involved research in several different data bases. The main data base sources were CINAHL and PubMed databases, National Guideline Clearinghouse, Cochrane Library, National Institute for Clinical Excellence (NICE), and the University of Iowa Gerontological Nursing Interventions Research Center. Search terms utilized were multifactorial fall assessment or multifactorial fall assessment guidelines in CINAHL and Google Scholar search engine. MeSH, (medical subject headings) in PubMed multifactorial fall assessment are coded as "Accidental Falls" and "Risk Assessment". CINAHL, PubMed and National Guideline Clearinghouse databases yielded appropriate results including systematic reviews, meta-analysis, randomized controlled trials, nonrandomized studies, and before and after fall prevention program studies on the effectiveness of multifactorial fall assessments in older adults. The American Geriatric Society, British Geriatrics Society, Australian Commission on Safety and Quality in Health Care, Registered Nurses Association of Ontario, National Guidelines Clearinghouse, and the University of Iowa

Gerontological Nursing Interventions Research Center have comprehensive guidelines with a grading system to support evidence and research references for fall prevention recommendations. The inclusive criteria for the literature search included research articles on community dwelling older adults 65 years of age or older, with and without cognitive impairment, included both high risk and general older adults, articles in English language and published within last10 years, both multifactorial and multi-component fall prevention interventions, and with conclusive research. Exclusive criteria were studies of fall prevention in programs studies involving only hospital, and long-term care facilities. A title review and brief view of abstracts of results from the literature search was done to find the most relevant studies. The University of Iowa's Gerontological Nursing Interventions Research Center grading schema, (Appendix B), was used to grade the evidence.

With evidence based research on multifactorial intervention and implementation for effective community based fall prevention programs advanced practice nurses and health care professionals from multiple disciplines can utilize research findings from the literature review in clinical practice as a guide in implementation of effective evidence based fall prevention program for community dwelling older adults.

Review of Literature

Effectiveness of Multifactorial Fall Interventions

In a reviewed prospective randomized control trial noted in a research article by Shumway-Cook et al. (2007) a community based comprehensive fall prevention program for older adults living in the community was shown to be effective in reducing falls. The study design included a multifactorial fall assessment, education, mobility, balance, and strengthening

three times a week over a year. The study took place at a non-profit medical research and educational center and was conducted by the State Department of Health in the state of Washington. Fall rates were based on self-reporting. A before and after 12 month study evaluation of mobility, strength and balance were done using standardized tests. The subjects included 453 community dwelling adults age 65 or older that participated in the study. The results of the study concluded that the rate of falls were 25% less in intervention group (Shumway-Cook et al, 2007). The intervention group had decreased number of falls needing medical attention, and the intervention group had significant improvements in mobility, strength, and balance noted with follow up assessment tests. The number of exercise classes attended correlated with decrease in fall rate (Shumway-Cook et al, 2007). Data indicates multifactorial fall prevention is effective.

There are few points to mention when considering the credibility of the study. Critique of this study showed that the outcome of fall reduction was influenced by a few individuals that had many falls and thus there was not a significantly reduction of falls in the intervention group. In addition, the fall prevention program may have been more successful in reducing falls if it was targeted at the more at risk population, (75% of individuals had not fallen in the past year and the average age was approximately 75; more fall risk factors could be noted on the assessment) (Shumway-Cook et al. 2007). The clinical application of this study indicates that multifaceted fall prevention intervention implemented by local and state public health partnership involving a multifactorial fall assessment, exercise and education can be utilized to decrease risk factors for falls and injuries.

Another prospective randomized control study reviewed in a research article by Beling and Roller indicated the effectiveness of multi-component fall prevention programs. The study

design included a fall risk assessment involving health status questionnaire, medication review, cardiovascular assessment, visual screening, sensory organization and motor control tests, and balance and functional measurements. The program provided physical therapy interventions towards fall risks identified in individual fall risk assessment and involved exercise and sensory improvement to prevent falls. One hour classes were scheduled three times a week for 12 months. Subjects were recruited through media advertisements. The average age was 80, there was an approximate equal ratio of men and women, and there was a mix of white, Hispanic, Asian in control and intervention group. The results of the study showed the mean numbers of falls were significantly less and functional status improved significantly during the three month intervention period in experimental group compared to the control group (Beling & Roller, 2009). The weakness of the study was the small sample size (around 20 older adults), physical limitations on criteria for participants, not all participants completed the study, and the study relied on each participant's self-reported falls (Beling & Roller, 2009). The clinical application of this study conclude that a multifactorial fall prevention program that includes community-based involving fall risk assessment, home assessment, and exercise is effective and safe in reducing falls and improving functional balance ability.

A third prospective randomized control study in a research article by Salminen, Vahlberg, Salonoga, Aarnio, & Kivel (2009) showed multi-component fall prevention effective in decreasing rates of falls in community dwelling older adults with depression and/or three or more recent falls. The study design involved a 12 month program including an assessment, education on fall prevention, home hazard assessment, exercise, and psychosocial support. Subjects were 65 years of age living independently in the community. A total of 591 subjects were randomly placed in intervention group and 298 in control group (Salminen et al., 2009). Recruitment of

participants occurred through health care facility advertisements, newspaper announcements, and through health professional referrals. The results showed that the community based fall prevention program decreased falls in those with depression and/or with a history of three or more falls, however, it did not decrease the rate of falls for the overall intervention group. Weakness of the study include only 41% of participants in the study had recently fallen in past year prior to study, falls were self-reported, and the research was based in Finland (Salminen et al., 2009). The program indicates fall prevention program is not effective in reducing falls in all individuals 65 or older and the importance of tailored interventions based on fall risks.

Fall prevention guidelines for older adults in the community have been established to be an easy reference for health care providers to promote multifactorial assessment and intervention to prevent falls and costly complications from falls (American Geriatric Society (AGS), 2010). AGS has developed a fall prevention guideline that provides updated evidence based guideline for assessment and individualized interventions strategies to address fall risks. A multifactorial fall assessment with interventions guideline and algorithm was developed from the extensive literature research on fall prevention and the evidence is graded based on the grading schema. Results indicate older adults 65 years of age or older should be screened for falls each year and those identified as being at risk should receive a comprehensive fall risk assessment and appropriate interventions noted on guideline (AGS, 2010). Based on the AGS findings single and multifactorial fall risk interventions have shown effective in decreasing falls. Multiple fall risk assessments are effective when multiple fall risk interventions are carried out (AGS, 2010). AGS states interventions should be tailored to fall risk factors identified in the multifactorial assessment, include an exercise component using physical therapy to improve balance, gait, muscle strength, flexibility (tai chi is option), review of medications (consider polypharmacy,

dose reduction, and side effects), and home safety check to assess for environmental adaption needs (AGS, 2010 and Barclay, 2011). The revised fall prevention guideline for health care professionals and general public provides updated evidence based guideline for assessment and individualized interventions strategies to address fall risks.

The University of Iowa Gerontological Nursing Interventions Research Center (GNIRC) has developed a comprehensive fall prevention guideline. The guideline recommendations are given an evidence grade based on the type of research study and the strength of the study. The guideline highlights that adults 65 years of age or older should be screened for falls each year and those identified as being at risk should receive a comprehensive fall risk assessment and appropriate interventions (Lyons & Titler, 2004). The guidelines recommend gait and balance screening of all older adults annually and this is different from AGS recommendations. The comprehensive fall evaluation involves an extensive evaluation of the older adult that may include referral to specialist and involve several members of the health care team in order to identify fall risk factors to strategize interventions to reduce risk of falls (Lyons & Titler, 2004). Details of the comprehensive multidimensional fall assessment from GNIRC Comprehensive Fall Risk Assessment are provided at the end of paper.

Implementation Strategies

Framework for implementing community based fall prevention program is extracted from the literature review and serves as a guideline for establishing fall prevention programs. Three steps were identified through literature research review in establishing a community based fall prevention program and include determining fall program objectives, collaboration, and promotion and evaluation of the program. The Center for Disease Control "Nine-step process in planning a fall prevention program for community older adults" based on expert opinion

provides a good framework for implementing a community-based fall prevention program for older adults (Center for Disease Control (CDC), 2008). Research on the review of literature on implementing multifactorial fall prevention programs for community dwelling older adults correlated with these nine steps and added important strategies for executing these steps. The three step implementation strategy for a fall prevention program formulated represents a concise version of these nine steps and incorporates findings from research articles in literature review. Details of research findings and further understanding of these three steps will be discussed.

Implementation Strategies: Determine Fall Program Objectives

The first step is to determine fall prevention objectives and includes assessing community resources, determining what fall risk factors will address, and establishing objectives for the fall prevention program. What the community needs for a fall prevention program and the community organization related services currently provided should be determined. The fall risk factors the program aims to address with measurable objectives and resources (organizations and community resources) for the fall prevention program must be assessed (CDC, 2008). The CDC emphasizes five important fall risk interventions for fall prevention programs that include: "1) the education is appropriate for audience taught by trained professionals; 2) a minimum of twice weekly progressive exercise programs to improve mobility, strength, and balance taught by trained professional certified in CPR/AED; 3) a review of medications (consider polypharmacy, psychoactive medications, need for vitamin D or calcium and alcohol screening); 4) a vision exam (dilated eye exam every two years); and 5) a home hazard assessment by trained professional" (CDC, 2008, p.21). Determining what risk factors the program will address can have an important impact on decreasing fall rates in the older adult populations living in the community.

A literature review research study with a focus on holistic care in article titled by Keller (2009) highlighted recommendations for community based fall prevention programs. The review stated that multifactorial fall assessments and interventions are part of providing holistic care, promoting healthy aging and independence. The author stated senior centers can be a good place for fall prevention programs and to invite health care professional from different specialties into the falls clinic to create comprehensive multifactorial fall prevention program (Keller, 2009). Also, noted by the *National Institute of Clinical Excellence* (NICE) (2004) cultural, language, mental and physical status and the individual should be considered in care planning for fall prevention interventions. Further, they recommend information on fall risk considerations be documented and communicated to other healthcare providers caring for the individual and a multidisciplinary collaborative approach to fall prevention (NICE, 2004). Providing patient centered care and considering the person as a whole is important when providing multifactorial fall interventions.

Implementation Strategies: Collaborate

Collaboration with local and state public health organizations, health care professionals/organizations and the community to gain support, financial funding, and resources to establish and maintain the fall prevention program is the second step mentioned in implementation of a fall prevention program (CDC, 2008). Finding the resources needed to establish the fall prevention program is critical and challenging. The next section will discuss studies on establishment of various fall prevention programs utilizing different methods and resources in the community.

Collaboration and coordination with community organizations and health care professionals is important to implementing a community based fall prevention program for older

adults. In a prospective study by Baker, Gottschalk & Bianco (2006) noted in their article a multicomponent evidence based fall prevention program called Step by Step for community dwelling older adults was successfully implemented in several senior centers by collaborating with senior center administrators and with community organizations. The study design included nine senior centers in diverse urban and suburban communities. The size of the facilities ranged from large, medium to small and the number of seniors served daily at each facility ranged from 20-325 (Baker, Gottschalk & Bianco, 2006). The senior center staff went through training and lead members of the senior center took an active part in implementing the program. Fall risks addressed included balance, postural hypotension, vision, gait, medications and home hazard fall risk factors. Health care providers, pharmacists, physical therapists and other health care professionals created a referral network and connected with the senior centers to provide professional services for fall prevention (Baker, Gottschalk & Bianco, 2006). The effectiveness of the program in reducing fall risks was not evaluated. The total number of seniors from all facilities was nearly 12,000 serving on average 1200 seniors daily (Baker, Gottschalk & Bianco, 2006). The results of this study showed a multicomponent evidence based fall prevention program can be successfully implemented in senior centers by collaborating with senior center administrators and with community organizations, however, the availability of community resources and financial funding determined whether the programs were sustainable after implemented.

Another prospective study conducted by Filiatrault et al., (2007) focused on implementing community-based fall prevention programs, demonstrating how community-based fall prevention programs can be disseminated according to established fall prevention program recommendations and can have high participation rates among older adults at risk for falls. The

study design involved evaluation of implementation of a multifactorial fall prevention program (Stand Up!) in community dwelling older adults with collaboration of community organizations. The 12 week Stand Up! program focused on exercise, balance, leg strength, decrease fear of falling, maintaining density of the bones, and reducing home hazards, and learning fall-safe techniques and education. Instructors were given a day training course. The program was established in 10 metropolitan areas in Montreal Canada (Filiatrault et al., 2007). The researchers evaluated if the target population was reached, if programs delivered according to recommendations, and participation rates.

The study involved a total of 200 seniors living in the community recruited from community organizations and media advertisement. The control group was 102 community dwelling seniors. The intervention group was 98 community dwelling seniors and the facility received funding from local health authorities to establish the fall prevention program. Half of the senior population met target population goal(s) including: had fallen in past year, had fear of falling, and had concern for unstable balance. Participants were heterogeneous in terms of socio-demographic and health characteristics, however, most participants were women (84% of participants) (Filiatrault et al., 2007).

The results of the study illustrated that the program was effective. The average class attendance and report of compliance with home exercise was around 75% (Filiatrault et al., 2007). Programs were delivered according to guidelines and by physical therapists. Compared to a control group the participants in exercise classes improved balance and mobility based on pre and post mobility and balance tests. The Stand Up! fall prevention program study demonstrated how similar multifactorial fall prevention program can be delivered according to recommendations, reach target population and be effective in reducing fall risks.

Outpatient clinics, day hospitals and home health agencies are resources that can be utilized to establish a fall prevention program. In a prospective study by Cox and Newton (2005) discussed in their article comprehensive a fall prevention program that was established in a day hospital. The study design involved a falls clinic that had a multidisciplinary team that assessed older adults at risk for falls that were referred from medical assessment audit. The fall program had a multidisciplinary approach and included nursing, medical, occupational therapy, physiotherapy, and social services. Interventions based on identified fall risks were then initiated which included health education, home visit, home exercise program and/or falls circuit (Cox & Newton, 2005). Evaluation of falls clinic was done by analyzing service delivery, work, clinical outcomes and patient survey questionnaire.

To assess the credibility of the study it is important to note details on the subjects involved and to critique the study design and findings. The participants audited and referred to the fall clinic were subjects that were visiting the day hospital for other reasons. A total of 150 patients participated in the fall clinic after assessed by the clinics audit team. Clinical outcomes were measured by an elderly mobility score, Tinetti score and the 180 degree turn pre and post fall clinic interventions and three months post clinic interventions. A random 20 individuals screened/audited were chosen to be evaluated to determine if they received a fall clinic appointment, multidisciplinary assessment, medical visit, physical therapy, occupational therapy, social service visit, and received appropriate interventions based on fall risk factors identified (Cox & Newton, 2005). Results of the study concluded after completion of fall clinic all participants were more confident. Eighty percent of participants had significant improvement in clinical outcomes in mobility and balance assessments and improved status was generally maintained after three months. The study did not indicate if the fall prevention program

decreased the rates of falls. In all cases evaluated the services were being delivered according to plan and all patients received appointment, multidisciplinary assessment and appropriate interventions. The fall program is sustainable and continues to operate and expand multidisciplinary support and the referral pathway (Cox & Newton, 2005). This study concludes that dissemination of fall clinics in day hospitals can be successful.

Another prospective research conducted by Shandro, Spain, Dicker and Rochelle (2007) in their article illustrated that a multicomponent fall prevention program can be established in a Level I Trauma Center and using multiple recruitment pathways has high participation rate of community dwelling older adults at risk for falls. The study design included multiple recruitment strategies for an older adult fall prevention programs that took place in a Level I trauma center over an 11 month time frame (Shandro et al., 2007). The four strategies of recruitment evaluated included referrals through primary healthcare providers, emergency medical services, the emergency department and lastly through self-referral from media awareness.

In order to assess the credibility of the study details on participants and a critique of study design and outcomes will be discussed. All participants in the program received strength training, a two home visit from occupational therapist and a pharmacist medication review. Patients were eligible for the program if 65 years of age or older, had a recent fall, and were living independently. The average age of participants was 81 years of age and 37% of those enrolled were male. Results of the study were a total of 91 older adults were referred to the fall prevention program and 61 individuals or 67% of them enrolled (Shandro et al., 2007). The rate of enrollment was highest for those self-referred or referred by primary healthcare providers than those referred through the ED or emergency medical services. This study was lacking data on

effectiveness of decreasing fall risk factors, injuries, or fall rates and/or the financial cost of program. Researchers stated instead of relying on volunteering for a fall prevention program an automated prompting in paperwork maybe a more effective recruitment strategy. In additions, public awareness on fall risk factors is needed to help older adults recognized if they are at risk (Shandro et al., 2007). The study demonstrated that multiple referral pathways can lead to successful recruitment of participants for fall prevention program.

Implementing a fall prevention program with continuous quality improvement based on the model-theory in Veterans Affairs (VA) facility has proven successful. In a prospective study by Ganz, Yano, Saliba & Shekelle (2009) a functional sustainable comprehensive fall prevention program for community dwelling older adults was established at a VA facility within their integrated health care system using a theory driven approach. The VA facility based in Los Angeles serves veterans and mostly older adults (1/4 over the age of 75). The facility sees nearly 20,000 patients 75 years of age or older in a 2 year span (Ganz et al., 2009). The facility is composed of several clinics linked within a system with acute care hospital, a couple of ambulatory care centers, and community living centers. Theories involved in implementing the fall prevention program included: the Oliver's organizational theory, Greenhalgh's systematic review of diffusion of innovations theory, and principles of continuous quality improvement (Ganz et al., 2009). Healthcare professional leaders and important stakeholders (nursing, physical medicine, rehabilitation, primary care, geriatrics providers, performance improvement and a researcher/clinician) in the community were invited to meetings regarding establishment of a fall prevention program in the community.

The fall prevention program used an existing telephone nursing advice line to place calls outgoing to fall risk patients referred by health care professionals in the VA facilities and self-

referral to assess their fall risk factors and make appropriate referrals to rehabilitation falls clinic, geriatrics clinic, home care services or physical medicine based on algorithm care model for services. In addition, the nurse triage system places follow up calls to assess adherence with referrals. The study lacked assessment of prevention of falls and better tracking of compliance with recommendations (home safety checks for example) (Ganz et al., 2009). The leadership meetings for the development of a functional and sustainable fall prevention program suggest that a theory driven approach to a fall prevention program establishment is successful. Moreover, the study showed using telephone triage lines can be a referral pathway for fall programs and a method to reach older adults in rural communities.

Implementation Strategies: Promotion and Evaluate Program

Promotion and evaluation is the final step in establishing a community-based fall prevention program. It is necessary to promote the program to assure appropriate recruitment of the target audience. The fall prevention program should gain public awareness through media, in health care facilities, social services and community organizations emphasizing fall risk screening (Stopfalls.org, 2006). The program needs to maintain support and funding through collaboration with organizations and quality reassurance measures (Baker et al., 2005). Evaluation and establishing quality assessment of the program is needed to determine if the program is meeting objectives and to allow modifications to improve the program as necessary.

Barriers for fall prevention programs need to be identified. In a prospective research study by Baker & et al., (2005) barriers to establishing a community-based fall prevention program were identified. The study design involved the Connecticut Collaboration for Fall Prevention (CCFP) and collaboration with other organizations and community leaders through

outreach over three years to establish a fall prevention program and identify barriers and facilitators to implantation (Baker et al., 2005). Facilitators and barriers were noted by the providers in work group meetings. The fall prevention program was called the CCFP fall risk-assessment and management strategy and was based on the multifactorial Yale Frailty and Injuries: Cooperative Studies of Intervention Techniques and other studies. The program addresses transfer difficulty, abnormal gait, impaired balance, postural hypotension, foot conditions, multiple medications, home hazards for falling, and vision problems. The program included provider and patient awareness and education, tailored programs to each health care organization, and promoted a network for referrals (Baker et al., 2005). The fall program was established in hospitals (7 total), outpatient facilities for rehabilitation (119 total), home care agencies (26 total) and primary care providers clinics (138 total) in central north Connecticut (Baker et al., 2005). Barriers and facilitators in implementation of this fall prevention program were identified and will be discussed next.

Several barriers and facilitators to implementation were recognized. Barriers included competing demands, time constraints, lack of encouragement from organizations/facilitators, fragmented care of healthcare systems to manage multifactorial and chronic risk factors, inadequate referral to multidisciplinary care, and inadequate payment reimbursement or Medicare coverage (Baker et al., 2005). The study states older adults need to be educated on fall prevention intervention so they will request recommendations for fall prevention from their providers (Baker et al., 2005). Recognizing networks for referrals and understanding Medicare regulations for reimbursement for fall prevention management is a facilitator in fall prevention program implementation.

FALL PREVENTION PROGRAMS

Current studies show that health care providers are not screening for fallers in the older adult population. Only one fourth of older adults are asked if fallen annually. Only 50% of falls with injuries or multiple falls are documented. Only three percent of older adults that fall receive a comprehensive examination and only ¼ of those that fall receive recommendations for fall prevention. A barrier to fall prevention intervention is lack of reimbursement for health care providers (Wu, Keeler, Rubenstein, Maglione, & Shekelle, 2010). Consideration of these barriers can assist in implementing a successful fall prevention program.

Medicare has proposed a Falls Rehabilitation Program (FRP) for high risk adults 65 years or older that have fallen recently. The plan would cover multifactorial fall prevention assessment, intervention, and follow up once a year. The multifactorial assessment and intervention would address balance, gait, mobility, functional limitations, orthostatic hypotension, medications, low vision, environmental hazards, and other medical conditions. A research study conducted by Wu et al., (2010) examined the cost-effectiveness of evidence-based fall prevention programs covered by Medicare and proposed Medicare coverage using a meta-analytic findings and population-based economic model (Wu et al., 2010). Data used to determine cost-effectives was based on current statistics on falls in older adults, the FRP model, and the proposed decrease in costly falls. Incidence of falls was based on 2008 among Medicare population. The cost estimate of providing FRP to these fallers was calculated. Multifactorial fall assessment and intervention has shown to reduce falls by 18% -40%. The model used fall reduction rate of 18% (Wu et al., 2010). The net cost of Medicare was determined by subtracting Medicare costs from the cost of the FRP program.

With the net cost of Medicare determined and the number of recurrent falls prevented the cost-effectiveness of the program was determined. It is estimated the program would prevent a recurrent fall in a half million people annually. The estimated cost is $1500 per person to prevent recurrent falls after taking into consideration the cost of the program and medical expenses (Wu et al., 2010). "The savings would be in from an all payer point of view" (Wu, Keeler, Rubenstein & et al., 2010, p.751). The study was a nonrandomized control study. The cost of implementation of the program and further benefits and cost saving of improved health were not calculated. More studies may be indicated, however, current research demonstrate that the Medicare FRP would be cost-effective.

Population based and individual fall prevention interventions have shown to be effective in reducing falls according to research by Campbell and Robertson (2010). A literature review analysis of population based interventions (community coordinated and multi-strategy interventions) showed a 6-33% reduction in fall-related injuries in studies. The nationwide fall prevention programs studied were established in different countries and this should be taken into consideration. The study stressed that fall programs should target the population that will benefit most and that there should be targeted interventions based on identified fall risks (Campbell & Robertson, 2010). Limitations of the study include lack of analysis of methodology of implementation of fall prevention programs. Randomized studies of population-based interventions, methods of implementing fall prevention programs, and evaluation of generalizability of population based programs are needed (McClure et al., 2008). Population based fall prevention programs have the potential to provide broad cost effective fall prevention compared to an individual based fall prevention assessment.

Main Points

There are some main points extracted from the literature review. This literature review concludes that multifactorial fall prevention interventions are effective in reducing falls. Community dwelling older adults should be screened for fall risk factors. Individuals at high risk for falls should receive a comprehensive fall risk assessment and tailored interventions to prevent falls. Implementation of fall prevention programs is a challenge and current research indicates identifying program objectives, collaboration, and evaluation and promotion of program are important. Key barriers to implementation of fall prevention programs are lack of professional and community awareness on fall prevention and reimbursement for providers in providing fall prevention management. Adequate referral pathways are a facilitator in program success. Weaknesses in implementation studies are they lack randomized control study, cost of implementing program, and/or study not indicate decrease rate of incidence of falls and further research is needed.

Discussion

Interpretation

Individuals with history of falls, (more than one in past year), or with unstable gait or balance are at high risk of future falls and should be targeted for a multifactorial fall assessment (AGS, 2010 & Lyons & Titler, 2004). There are numerous factors that contribute to falls and the most effective health promotion strategy to reduce falls in the older adult population is a multifactorial approach (Beling & Roller, 2009). Multifactorial fall interventions have proven more effective in reducing falls than single fall prevention interventions (Barclay, 2011). Multifactorial programs to prevent falls have proven most effective in community-dwelling older

adult population and have shown to reduce falls by around 15% (Mulhausen, 2009). Implementation strategies for community based fall prevention programs include identify program objectives, collaboration, and promotion and evaluation of the program. Appropriate referral pathways facilitate success of fall prevention programs. Health care providers and the community need public awareness on fall prevention and appropriate reimbursement methods are needed for healthcare providers to manage fall prevention in older adults.

Outcome/Dissemination

The review of literature objectives was to determine if multifactorial fall prevention interventions were effective in reducing falls in the community dwelling older adult 65 years of age or older. Research indicates multifactorial fall prevention interventions are effective and multifactorial community based fall prevention programs for older adults can prevent falls.

Three steps were identified through literature research review in implementing a community based fall prevention program. The three steps include determine fall prevention objectives, collaboration, and promotion and evaluation of the program. In addition, a theory based approach can be used to provide framework for disseminating a fall prevention program. It was noted in research studies that feasible successful fall prevention programs can be conducted by local and state public health partnership (Shumway-Cook et al., 2007). Day hospitals, senior centers, home health agencies, and community recreational centers can be utilized for fall prevention programs (Campbell & Robertson, 2006). Multiple referral pathways to reach target population and get appropriate recruitment for participants in fall program are ideal (Shandro et al., 2007). Health care providers, public health agencies, and the community need education and awareness on fall prevention in community dwelling older adults in order to

gain support and collaboration needed to initiate a fall prevention program. Standardization in providing fall prevention interventions and proper reimbursement methods are needed for providers to manage fall prevention in the older adults. Randomized research studies on further costs, benefits, and rates on decrease in incidence of falls with implementing community based and population based fall prevention programs for older adults living in the community are needed.

For dissemination of this literature review finding a presentation on fall prevention was given for community dwelling older adults for the Minnesota Wright County Public Health Department. PowerPoint handouts, brochures and a poster were used as educational tools. The presentation discussed why fall prevention is important, why older adults are at risk, what research states is effective in reducing fall in fall prevention programs, individual and population based interventions to reduce falls and lastly what would be included in a comprehensive fall assessment. After the presentation the public health care workers were asked if they felt they had better understanding on methods to decrease falls in older community dwelling adults and they stated they did and the presentation opened up to discussion on fall prevention implementation strategies for certain cases and for the public.

Implications for Nursing

The literature review summarized evidence based findings support multifactorial fall prevention interventions and provides operational guidelines for fall prevention program interventions. Several important nursing implications have been extracted from the fall prevention literature review research. Health care providers should screen older adults for risk of falls by assessing for history of falls or unsteady gait annually (Lyons, & Titler, 2004).

Individuals with history of fall(s) or unsteady gait should have a comprehensive multifactorial fall risk assessment to address fall risk factors (Barclay, 2011). Intervention should be tailored to fall risk factors identified in the multifactorial assessment, include an exercise component using physical therapy to improve balance, gait, muscle strength, flexibility (tai chi is option), review of medications for polypharmacy, possible dose reduction, and side effects, and home safety check to assess for environmental adaption needs (AGS, 2010 and Barclay, 2011). Advance practice nurses and health care providers can educate the public on fall risk and interventions to prevent falls, help establish fall prevention programs, provide screening for fall risks, perform comprehensive fall risk assessments for high risk older adults, provide referrals and interventions based on identified fall risks and follow up with adherence to recommendations to provide quality fall prevention management. Advanced practice nurses and health care professionals can advocate for policy change to develop a fall prevention screening, referral, and intervention protocol and appropriate reimbursement methods for fall prevention management for older adults.

The three steps identified summarize findings in researched literature review and can guide advanced practice nurses and health care providers in establishing a community based fall prevention program. Advance practice nurses and health care providers can collaborate with local and state public health organizations, health care professionals/organizations and the community to determine fall program objectives and gain support to establish, promote, maintain, monitor and improve the fall prevention program. Proper reimbursement for providers to manage fall prevention in older adults needs to take place at the systems level and nurses can be advocates for this and support Medicare Falls Rehabilitation Program.

Summary

Older adults are at increased risk for falls and fall related injuries due to age related factors and disease conditions. Falls increase mortality and morbidity, decrease quality of life and are a financial strain for the individual and the healthcare system. With a growing adult population health care providers and the health care system need to implement evidence based methods to prevent falls in older adults. Sixty percent of falls are the result of multiple fall risk factors with the risk of a fall increasing with increased risk factors (AGS, 2010). With proper multifactorial assessment there then can be appropriate interventions utilized to address fall risks (Diener & Mitchell, 2005).

Is multifactorial fall assessment effective in reducing falls and fall risks factors? There have been many studies on the effectiveness of single and multifactorial fall prevention with some conflicting data. Also, there is limited understanding on effective fall prevention program implementation. This evidence-based literature review finding conclude that significant overwhelming data supports multifactorial fall assessment and interventions in reducing fall risks and fall rates. Furthermore, a cost-effective fall prevention programs includes a fall-risk assessment with interventions tailored to identify fall risk factors.

Clinical practice recommendations were culminated from this study. Health care providers should screen older adults for risk of falls by assessing for history of falls or unsteady gait annually. Second, individuals with history of falls, (more than one in past year), or with unstable gait or balance are at high risk of future falls and should be targeted for a multifactorial fall assessment. Lastly, interventions should be tailored to risk factors identified in the multifactorial assessment, (AGS, 2010 & Lyons & Titler, 2004). Three steps were identified

through literature research review in implementing a community based fall prevention program and include: determine fall prevention objectives; collaboration with organizations, health professionals and community; and promotion and evaluation of the program. Health care providers and the community need public awareness on fall prevention and appropriate reimbursement methods are needed for healthcare providers to manage fall prevention in older adults. A multidisciplinary approach and a network of multiple referral pathways to reach target population and get appropriate recruitment for participants in fall program is important (Shandro et al., 2007). In conclusion, fall prevention programs should have a multifactorial approach and proper organization and coordination is important to create a cost effective successful fall prevention program for community dwelling older adults.

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Appendix A

The University of Iowa Gerontological Nursing Interventions Research Center Research Translation and Dissemination Core Grading Schema

A = Evidence from well-designed meta-analysis, or well-done synthesis reports such as those from the Agency for Healthcare Policy and Research (AHRQ), or the American Geriatric Society (AGS).

B = Evidence from well-designed controlled trials, both randomized and nonrandomized, with results that consistently support a specific action (e.g. assessment, intervention or treatment).

C = Evidence from observational studies (e.g. correlational descriptive studies) or controlled trials with inconsistent results.

D = Evidence from expert opinion or multiple case reports.

University of Iowa Gerontological Nursing Interventions Research Center Comprehensive Fall Assessment

1) Fall History, Fall Circumstances, and Fall Risk Factors Assessment

Description of fall details (frequency, symptoms at time of fall, injuries & etc)

2) Health History and Functional Assessment (chronic and/or acute medical conditions (cardiovascular disease, incontinences, osteoporosis, diabetes, neurological conditions, anemia, respiratory conditions, nutritional status & etc), physical examination with evaluation of functional status and fear of falling (evaluate factors contributing to deconditioning), assessment of activities of daily living (ADL) (American Geriatric Society, 2010)).

3) Medications and Alcohol Consumption Review (prescription, psychotropics and over-the counter)

4) Vital Signs & Pain Assessment

5) Vision Screening (assess visual acuity)

6) Gait & Balance Screening & Assessment

7) Musculoskeletal and Foot Assessment (muscle strengthening focusing on lower extremities, and examination of the footwear and feet). (Older adults with leg weakness can be five times more likely to fall, (Beling, & Roller, 2009)).

8) Continence Assessment

9) Cardiovascular Assessment (pulse, postural blood pressure, rhythm, and response to carotid sinus stimuli)

10) Neurological Assessment (including cognitive and neurological function evaluation, assess peripheral nerves in lower extremities and proprioceptive reflexes, cortical, cerebellar and extrapyramidal tests should also be performed along with screening for dementia, (American Geriatric Society, 2010)).

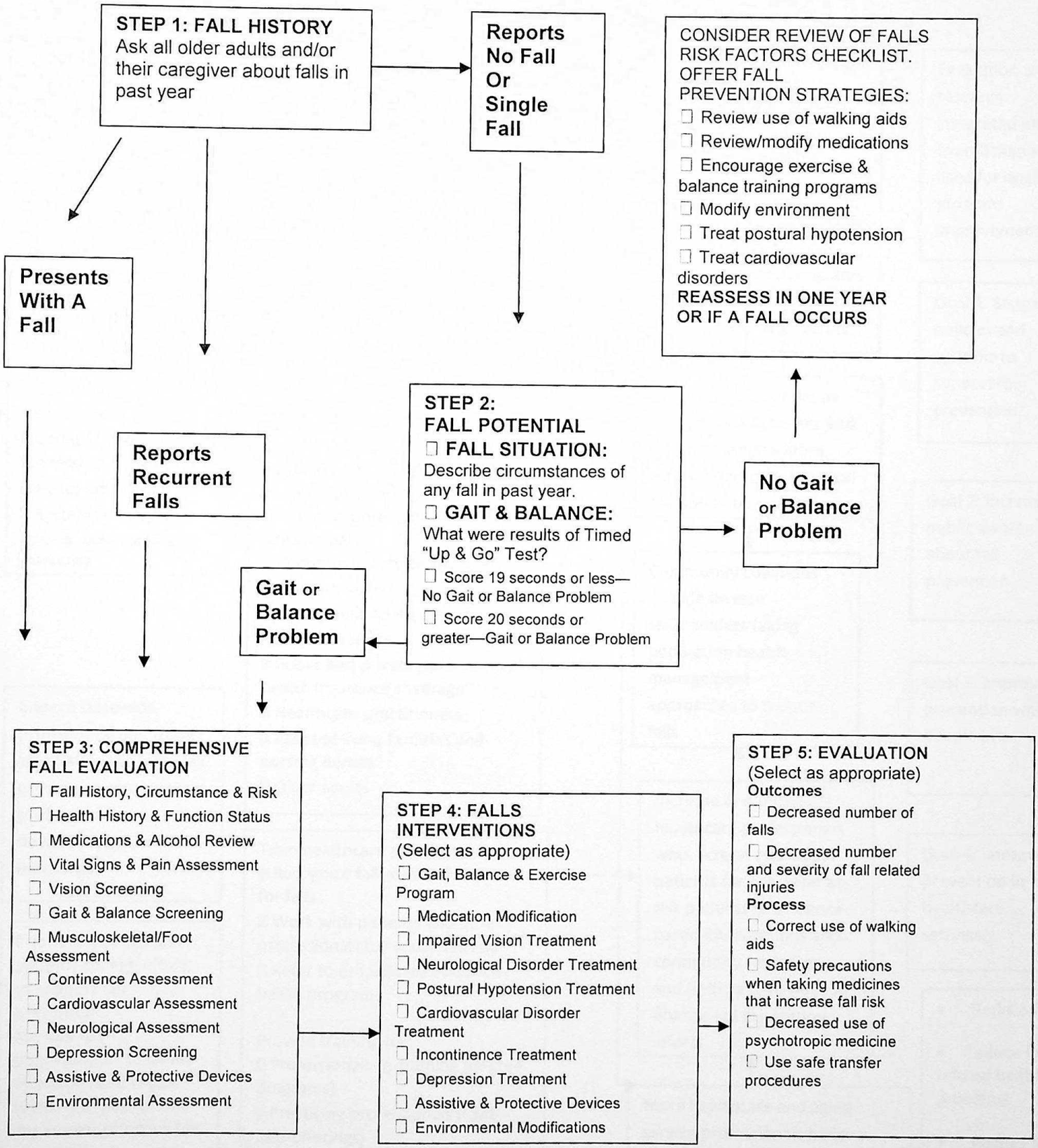
11) Depression Screening

12) Walking Aids, Assistive Technologies, & Protective Devices Assessment (proper use of mobility aides and adaptive equipment should be evaluated)

13) Environmental assessment (equipment and furniture guidelines for older adults, bed/chair/toilet height, secure rugs, hand rails, lighting, address slippery floors) (Lyons & Titler, 2004).

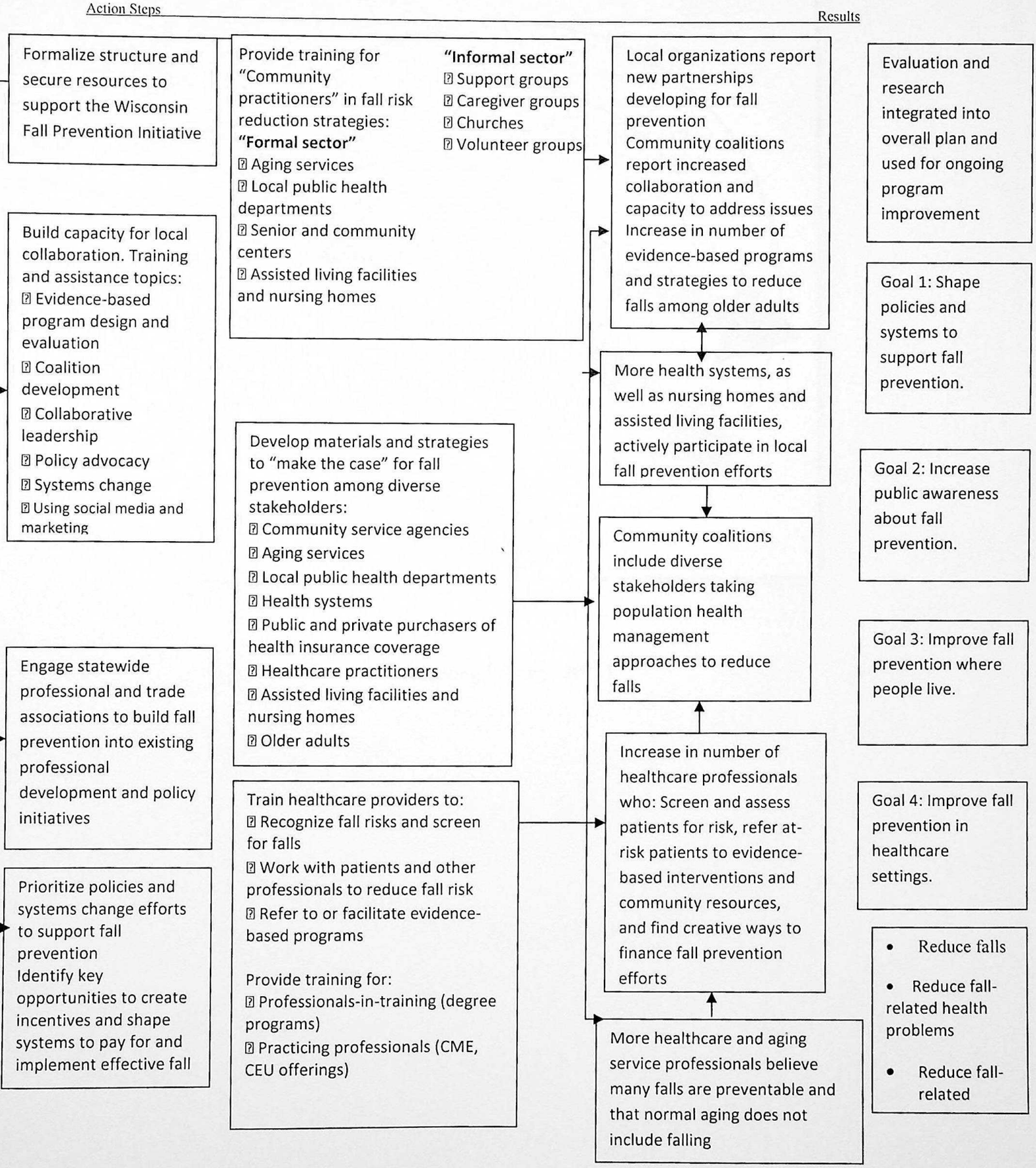
Appendix B

The University of Iowa Gerontological Nursing Interventions Research Center Algorithm

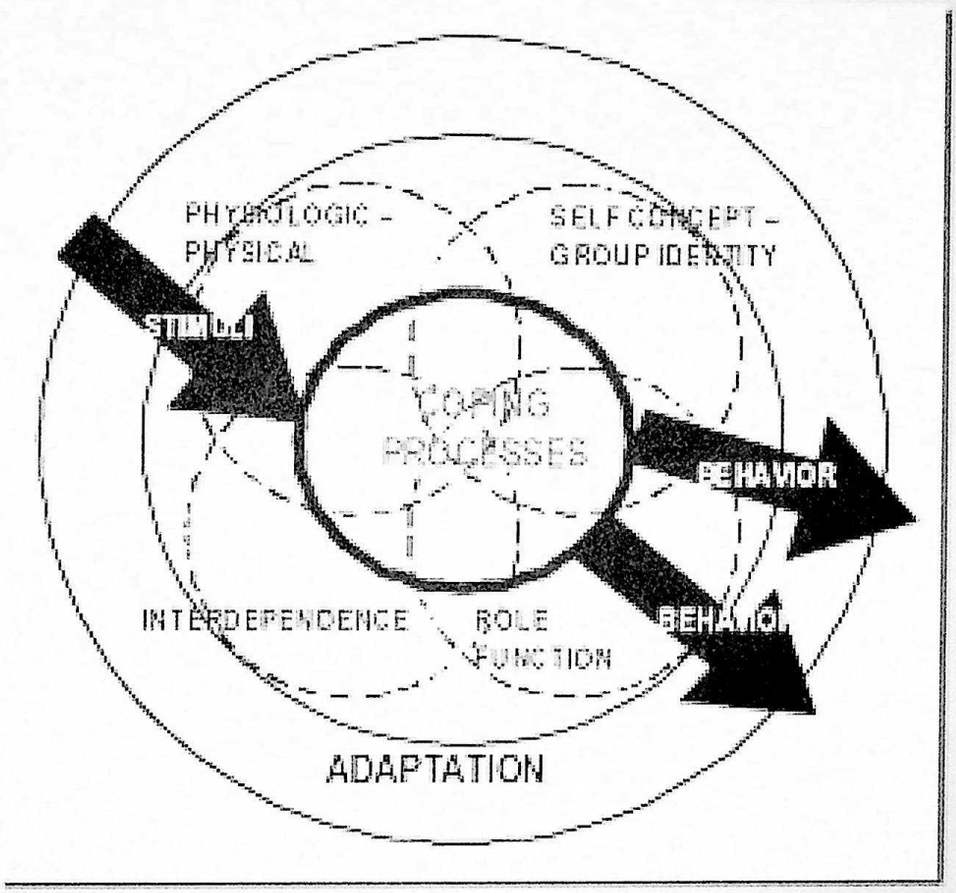


Appendix C

Wisconsin Fall Prevention Plan: Overview (Wisconsin Department of Health Services, 2010).



Roy Adaptation Model



(Nursing Library, 2011).